CHAPTER 5

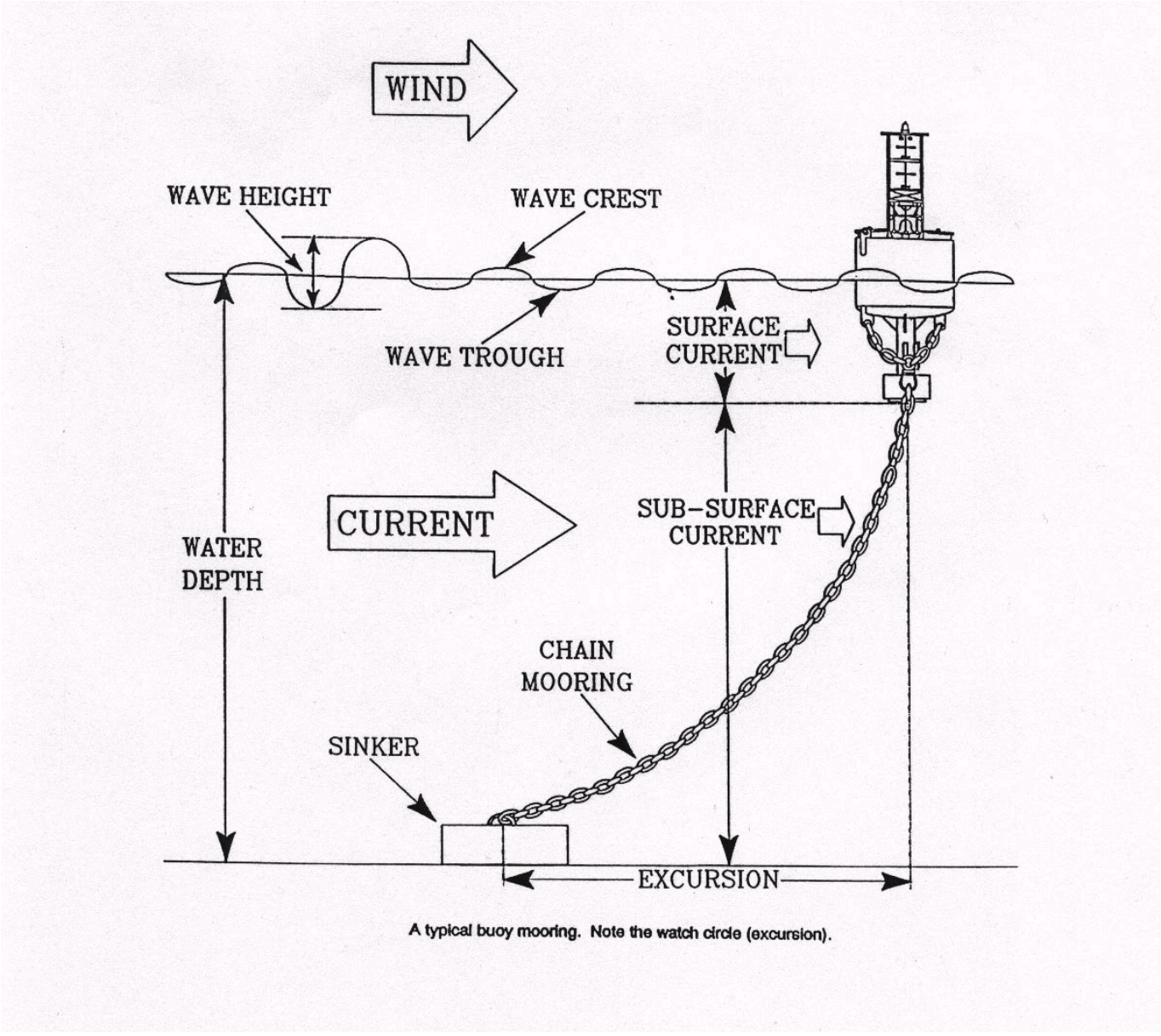
AIDS TO NAVIGATION

1) CAUTIONARY INFORMATION REGARDING AIDS TO NAVIGATION

The aids to navigation depicted on charts comprise a system consisting of fixed and floating aids with varying degrees of reliability. Prudent mariners will not rely solely on any single aid to navigation, particularly a floating aid.

The buoy symbol is used to indicate the approximate position of the buoy body and the sinker, which secures the buoy to the seabed. The approximate position is used because of practical limitations in positioning and maintaining buoys and their sinkers in precise geographical locations. These limitations include, but are not limited to: imprecision in position fixing methods, atmospheric and sea conditions, the slope of and the type of seabed, varied mooring lengths, and periodic maintenance visits which often occur more than a year apart. The position of the buoy hull can be expected to shift outside the charting symbol due to the forces of nature. The mariner is also cautioned that buoys are liable to be carried away, shifted, capsized, sunk, or set adrift. Lighted buoys may be extinguished or sound signals may not function as the result of natural causes, collisions, other accidents, or vandalism.

A prudent mariner must not rely completely upon the position or operation of floating aids to navigation, but will also utilize bearings from fixed objects and aids to navigation on shore.



A typical buoy mooring. Note the watch circle (excursion).

2) REPORTING DANGERS TO NAVIGATION

Mariners may occasionally discover uncharted shoals, malfunctions of important navigational aids, or other dangerous situations that should be made known to other navigators. A warning message should be broadcast to all stations in the vicinity. The broadcast should include a description of the danger, a latitude and longitude position, and a geographically referenced location of the danger.

Then report the danger to the nearest Coast Guard station. This report should contain:

a) **What:** Description of the danger.
b) **When:** Time and date.
c) **Where:** Latitude and longitude, and reference to nearby geographic features, i.e. bearing and range, if possible (also reference chart in use).
d) **Who:** Reporting vessel and observer.

Additional guidance in the reporting of navigational information can be found in the back of the Weekly Notice to Mariners published by National Imagery and Mapping Agency (NIMA). Instructions and a form are provided together with the proper addresses.

3) REQUIRED REPORTING OF DAMAGED U.S. AIDS TO NAVIGATION

Aids to Navigation are frequently collided with, resulting in damage, displacement, or complete loss. The Marine Investigation Regulations, Section 4.05-20 of Title 46 CFR, require the mariner to report a damaged or inoperative aid to the Coast Guard. The report should be made using the format shown above.

4) VANDALISM OF AIDS TO NAVIGATION

Coast Guard operated aids to navigation are sometimes damaged, defaced, or destroyed by vandals. This may create a serious safety hazard for the mariner. The primary targets for vandals are usually buoys and lights on structures located on the end of jetties and breakwaters. Those convicted of defacing or destroying a federal aid to navigation shall be guilty of a misdemeanor and subject to a fine of up to $2500 but not less than $500 or imprisonment or both. Those providing information leading to a conviction may be rewarded one half of such a fine. All citizens are requested to report sightings of any vandalism to the nearest Coast Guard unit or the Eleventh Coast Guard District Operations Center at (510) 437-3700 or the closest law enforcement agency.

5) PRIVATE AIDS TO NAVIGATION INCLUDING MOORING BUOYS

A private aid to navigation is any aid to navigation (i.e. light, buoy, daybeacon, mooring buoy, marker buoy, etc.) operated in the navigable waters of the United States, other than those operated by the Federal Government. Federal Regulations prohibit any person from establishing, maintaining, discontinuing or changing ownership of any aid to navigation, or mooring buoy without first obtaining permission to do so from the U.S. Coast Guard. To establish and maintain a private aid to navigation, an application must be completed and submitted to the U.S. Coast Guard. Examples of structures that may require a private aid are: breakwaters, piers, slips, floats, dikes, pilings, water-ski ramps, etc. Buoys are used to mark areas such as swimming areas, rocks, obstructions, submerged pipelines, controlled areas, and race courses. Applications are available by writing or calling:

Commander (oan)
Eleventh Coast Guard District
Coast Guard Island, Bldg 50-3
Alameda CA 94501-5100
(510) 437-2983

Applications are also available on the internet at: http://www.uscg.mil/d11/oan/application.pdf.

Once approved and established, a private aid must be maintained in conformance with its approved characteristics described on the Private Aids to Navigation Application. Private Aids are subject to inspection/verification by the Coast Guard and Coast Guard Auxiliary at any time and without prior notice. The Aids to Navigation & Waterways Management Branch will contact private aid owners, advising them of discrepancies found during verification surveys.

Private aids to navigation lawfully maintained are entitled to the same protection against interference or obstruction as is afforded by law to Coast Guard Aids to Navigation. Any person obstructing or interfering with an authorized private aid to navigation shall be deemed guilty of a misdemeanor (33 CFR 70.01).

6) RACONS

A RACON is a radar beacon which produces a coded response in the form of a Morse code character on the radar screen, when triggered by a radar signal. They are normally operated in the frequency ranges of the X-band and S-band marine radars. RACONs are becoming more prevalent as an aids to navigation to mark bridges or structures that present significant hazards to navigation. RACONs provide radar enhancement, improve aid identification, and help during the transition from ocean to inland navigation. A RACON on an aid to navigation assists the mariner in distinguishing that aid from other aids and vessels.

The following Coast Guard RACONs are maintained in the Eleventh District:

Platform Harvest
(LLNR 203) RACON: M (- -)

San Francisco Approach Lighted Horn Buoy SF
(LLNR 360) RACON: M (- -)

San Diego Bay Approach Lighted Whistle Buoy SD
(LLNR 10/1485) RACON: M (- -)

Long Beach Channel Approach Lighted Whistle Buoy LB
(LLNR 3010) RACON: C (- . - .)

Los Angeles Channel Approach Lighted Bell Buoy LA
(LLNR 3105) RACON: O (- - -)

Harding Rock Lighted Buoy HR
(LLNR 4330) RACON: K (- . -)

Privately maintained RACONs permitted in California:

Platform Gail RACON G
(LLNR 187) RACON: G (- - .)

San Francisco-Oakland Bay Bridge RACON N
(LLNR 4426) RACON: N (- .)

San Francisco-Oakland Bay Bridge RACON B
(LLNR 4446) RACON: B (- . . .)

San Francisco-Oakland Bay Bridge RACON Y
(LLNR 4461) RACON: Y (- . - -)

San Mateo-Hayward Bridge RACON M
(LLNR 5156) RACON: M (- -)

Richmond San Rafael Bridge Main Channel (West)
(LLNR 5628) RACON: Q (- - . -)

Richmond San Rafael Bridge East Channel
(LLNR 5629) RACON: T (-)

Southampton Shoal Channel Outfall Lighted Buoy WCA1
(LLNR 5661) RACON: K (- . -)

Carquinez Strait Bridge North Channel RACON N
(LLNR 6216) RACON: N (- .)

Carquinez Strait Bridge South Channel RACON C
(LLNR 6217) RACON: C (- . - .)

Benicia-Martinez Highway Bridge RACON B
(LLNR 6286) RACON: B (- . . .)

Antioch Bridge RACON Z
(LLNR 6717) RACON: Z (- - . .)

Rio Vista Bridge RACON T
(LLNR 7331) RACON: T (-)

Golden Gate Bridge RACON G
(LLNR 4262) RACON: G (- - .)

San Diego - Coronado Bay Bridge RACON C
(LLNR 1861) RACON: C (- . - .)

San Diego - Coronado Bay Bridge RACON T
(LLNR 1859) RACON: T (-)

7) LORAN

LOng RAnge Navigation, (LORAN), is an electronic aid to navigation consisting of shore-based radio transmitters. The LORAN system enables users equipped with a LORAN receiver to determine their position quickly and accurately, day or night, in practically any weather.

For information on the LORAN system, contact Coordinator of Chain Operations (COCO), West Coast at (707) 765-7590.

Copies of the LORAN-C Users Handbook are stocked and available through the Government Printing Office (GPO) at the following address:

Superintendent of Documents
Order Section
U.S. Government Printing Office
Washington, D.C. 20402

8) GLOBAL POSITIONING SYSTEM (GPS)

The Global Positioning System (GPS) is a navigation system which provides precise, worldwide, three dimensional navigation capabilities. Though the system was designed for military applications, merchant, recreational and fishing vessels can use it. The GPS Standard Positioning Service (SPS) is available to mariners using a variety of commercial receivers.

The GPS uses a network of 24 satellites (21 operational and 3 spares) when the system is fully operational. The satellites are placed in 1 of 6 precisely spaced orbital planes. Ideally, 4 satellites will be visible from any position on the earth and will provide instantaneous position information. By comparing ranges to each satellite, a GPS-SPS receiver will provide positions with a horizontal accuracy of approximately 100 meters. The basic 1 channel receivers available for civilian use produce continuous fixes at 30 second intervals. More sophisticated multi-channel receivers, which receive information from 4 satellites simultaneously, have been designed for aircraft and other high-speed vehicles.

The Coast Guard has opened a Navigation Information Center (NAVCEN) in Alexandria, VA which acts as a clearing house for information about GPS and other radio navigation systems. This information is available to civilians and all non-Department of Defense personnel. GPS status information can be obtained from:

a) USCG Maritime information broadcasts on VHF-FM channel 16/22A and HF/USB 2182/2670 kHz.

b) Radio stations WWV (FT Collins, CO) at minutes 14 and 15 on 2.5, 5, 10, 15 and 20 mHz and WWVH (Kaui, HI) at minutes 43 and 44 on 2.5, 5, 10, and 15 mHz.

c) DMAHTC Weekly Notice to Mariners and Broadcast Warnings (HYDROPAC/HYDROLANT/NAVAREAS IV and XII), and DMA's navigation information network bulletin board (NAVINFONET).

d) Navigational warning system data broadcast (NAVTEX) on 518 kHz.

e) The NAVCEN 24 hour voice recording at (703) 313-5907.

f) USCG Local Notice To Mariners.

g) Petaluma Control Center watchstanders, 24 Hours per day, at (707) 765-7612 to answer questions directly.

h) NAVCEN INTERNET Address: http://www.navcen.uscg.gov/.

GPS Brochures and Publications are available upon request from:

Commanding Officer
NAVCEN
7323 Telegraph Rd
Alexandria, VA 22310-3998
Telephone: (703) 313-5900
FAX: (703) 313-5920

9) DIFFERENTIAL GLOBAL POSITIONING SYSTEM (DGPS)

DGPS for the Eleventh Coast Guard District has achieved initial operating capability. Five transmission sites are located along the coast of California to provide navigational accuracy of 10 meters or less. DGPS reference stations determine range errors and generate corrections for all GPS satellites "in view." DGPS serves government and civil users alike, particularly for navigational purposes. Coast Guard applications will include ice operations, search and rescue, and placement of aids to navigation.

STATION:	FREQ:	RATE:	RANGE:
Point Loma	302 kHz	100 baud	180 NM
Lompoc	321 kHz	100 baud	180 NM
Point Blunt	310 kHz	200 baud	60 NM
Pigeon Point	287 kHz	100 baud	180 NM
Cape Mendocino	292 kHz	100 baud	180 NM